Business challenge

As storms grow in number and intensity, Hydro One Networks Inc. sought a data-driven predictive solution that would allow it to improve customer service by responding faster to power outages.

Transformation

A large utility in Ontario, Canada, Hydro One needed to maintain service quality across 310,000 square miles of power lines, even during severe storms. With the Weather Company Outage Prediction service from IBM, the utility can predict outages down to the operating center boundary level and proactively mobilize crews to address outages.

Derek Role
Director of
Distribution System
Control & Emergency
Management
Hydro One
Networks Inc.

Results

~33% faster power restoration during an ice storm
in which crews returned power to 500,000 customers in four days

Improves the customer experience
by using data-driven forecasts to send alerts and quickly address outages

Minimizes storm operation costs
through accurate, proactive mobilization of emergency response teams

Hydro One Networks Inc.

Restoring customers' power 33 percent faster with AI-driven weather insights

Hydro One Inc. is a fully owned subsidiary of Hydro One Limited, Ontario's largest electricity transmission and distribution provider with almost 1.4 million customers, nearly CAN 25.5 billion in assets and 2018 annual revenues of about CAN 6.2 billion. Its team of approximately 8,600 skilled employees are dedicated to building and maintaining a safe, reliable electricity system, essential to supporting strong and successful communities. Hydro One Limited's common shares are listed on the Toronto Stock Exchange (TSX: H).

"With the Outage Prediction service, we can look out 72, 48 and 24 hours in advance, mapping forecasts against our emergency response staging and planning."

—Derek Roles, Director of Distribution System Control & Emergency Management, Hydro One Networks Inc.

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and predictions that could be used to put our crews in the best position to respond to our customers."

Without accurate weather insights coupled with the predicted system impact, any efforts to strategically mobilize emergency response teams ahead of storms could result in misplaced resources. Instead, Hydro One focused on rapidly assessing damage and deploying recovery crews after storms.

However, customers and public utility regulators continued to expect high service levels from Hydro One. The company needed to deliver safe, reliable and affordable services, despite changing climate patterns. "Hydro One has always done a good job at responding to major weather events," explains Roles, "but we needed to take it to the next level and have a better understanding of the potential impacts within certain areas of our service territory so that we could prepare in advance and ultimately restore power more quickly to our customers."

Hydro One sought a data-driven predictive solution that would allow the company to determine in detail how adverse weather will potentially affect its electrical distribution network. Armed with these insights, the company could forewarn customers more quickly, activate emergency response teams sooner and restore power faster.

Chasing power outages across a vast province

Weather-related power outages are a fact of life in Ontario, Canada. Wintertime generally delivers subzero temperatures with freezing rain, wind and snow, while warmer months can bring thunderstorms characterized by torrential rains, strong winds and possible tornados. Government and disaster relief organizations recommend that citizens plan ahead

for outages by keeping three days' worth of emergency supplies on hand. They also advise everyone to listen to local weather forecasts and follow storm warnings and alerts.

Planning ahead for weather-related outages was more difficult for Ontario's largest electric utility company, Hydro One. The utility company supplies power to nearly 1.4 million residents and businesses in an area that encompasses approximately 75 percent of the province, including remote

communities in northern Ontario. Predicting exactly where, when and how severe weather will affect power lines and equipment was extremely challenging, given the company's limited weather data and expertise.

"Our control room team used the tools available to them to stay on top of incoming weather systems," says Derek Roles, Director of Distribution System Control & Emergency Management at Hydro One. "However, those tools were not effective in providing the modeling

Accurately predicting outages

After evaluating different services, Hydro One chose the Outage Prediction solution from The Weather Company, an IBM Business. Powered by Watson™ AI technologies on IBM Cloud, the service combines up-to-date, hyperlocal weather forecasts and historical weather data from The Weather Company with five years of Hydro One historical outage data. It then uses the data to develop and train a machine-learning prediction model tailored to Hydro One's service territory. With the model, the utility can determine with high accuracy where weather-related outages and infrastructure damage will occur, down to the operating center boundary level.

"With the Outage Prediction service, we can look out 72, 48 and 24 hours in advance, mapping forecasts against our emergency response staging and planning for storm management," says Roles. "This lets us activate our emergency procedures well in advance so we are ready when the storm hits."

IBM worked collaboratively with Hydro One to test and deploy the model and continues to provide support as needed. "The response from IBM has been fantastic to date. Whenever we reach out, IBM's response to making the product better has been very beneficial," says Roles. He also stresses that the strong trust Hydro One established

with IBM—and IBM's ability to deliver accurate weather insights—has helped ensure the utility's ongoing success with the solution.

For instance, shortly after deployment, a major ice storm with 60 mph winds hit Ontario in early spring. In the 72 hours before the storm appeared, the service forecast more than 1,000 potential outage incidents across the utility's 310,00

square-mile power grid. Using the insights, the Hydro One Incident Command Center (ICC) team coordinated with the utility's four regional forward command posts and 55 operations centers to mobilize a comprehensive response, proactively positioning crews in the storm's predicted path. An accurate forecast also helped the utility more effectively staff call centers and warn customers of the storm's pending impact.

As the storm rolled across Ontario, well-positioned response teams could act more quickly than ever before. They scaled repairs from the main transmission grid to smaller circuits down to individual locations in remote areas, allowing customers the relief of once again having electricity. The ICC could also optimize crew deployment so that each team had opportunities to rest, helping ensure employee safety.

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Restoring power 33 percent faster

Hydro One has made the Outage Prediction solution an important component of its overall response and restoration processes. Whereas previously the utility could only react to severe weather events, it can now proactively decide where and when to pre-stage restoration crews and equipment, based on timely, accurate, hyperlocal weather insights. As a result, the utility improves the customer experience through accurate outage alerts and faster resolution. It also assists in overall cost reduction for major events.

During the early spring storm, for example, Hydro One crews restored power to 500,000 customers in just four days—33 percent faster than after similar storms. In addition, it minimized restoration costs by targeting mobilization resources on areas predicted to suffer the most damages. In recognition of its effective restoration efforts for that storm, Hydro One received an Emergency Response Award from the Edison Electric Institute.

"The first 12 – 24 hours are critical for an event," explains Roles. "If we can get in front of an event and activate a response earlier, we can be more effective in providing our customers with better information and faster restoration."

Solution components
- IBM® Cloud
- Weather Company Outage Prediction
- IBM Watson Media and Weather

Take the next step
To learn more about the IBM solutions featured in this story, please contact your IBM representative or IBM Business Partner.

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